

## **REMARKS**

### **Status of the Claims**

Claims 2, 5, 8, 9, 15, 16 and 18-22 are now present in this application. Claims 2 and 5 are independent. Reconsideration of this application is respectfully requested.

### **Rejections under 35 U.S.C. §103**

Claims 2, 5, 8, 9, 15, 16 and 18-22 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Sato et al., JP 141494 A (hereinafter “Sato”) in view of Patel, US 4,089,618 (hereinafter “Patel”).

Claims 21 and 22 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Sato in view of Patel, and further in view of Takada et al., JP 40116749 A (hereinafter “Takada”).

These rejections are respectfully traversed.

In order to support a rejection under 35 U.S.C. § 103, the Examiner must establish a *prima facie* case of obviousness. To establish a *prima facie* case of obviousness three criteria must be met. First there must be some rationale to combine the cited references. Second, there must be a reasonable expectation of success. Finally, the combination must teach each and every claimed element. In the present case, claims 2, 5, 8, 9, 15, 16 and 18-22 are not rendered unpatentable by the combination of Sato and Patel for at least the reason that the combination fails to disclose each and every claimed element as discussed below.

Aspects of the present invention are directed to reducing the level of aerodynamic noise produced by an air flow passing through a blade of an impeller of a blower. Independent claims 2 and 5 are directed to an impeller for a cross-flow fan. Specifically, independent claim 2 recites, *inter alia*,

a plurality of notches provided on an outer edge of a pair of side edges of each of the blades, and arranged at predetermined intervals along a longitudinal direction of the respective blades...

wherein in a case where a pitch of the notches is denoted as S, and a length of each of smooth portions is denoted as M, a rate M/S of the length M of the smooth portions to the pitch S of the notches is set to  $0.3 < M/S < 0.8$ .

Independent claim 5 recites similar features of claim 2 above. Thus, the following remarks also apply to claim 5.

Contrary to the assertion by the Office Action, the asserted combination of Sato and Patel fails to disclose at least the above-noted claimed feature.

Patel discloses a propeller fan having a rotor hub 18 and a plurality of blades 20 carried on the hub 18. A series of notches in the trailing edges of the blades 20 having all of the same pitch and dimensions are longitudinally displaced along the edge of the blades from each other by an amount less than the pitch of the notches. According to Patel, an undesirable noise is suppressed. See lines 16-24, col. 4 of Patel.

Sato discloses a cross-flow fan having a plurality of blades 19 that extend in parallel to a rotation axis of the fan. A plurality of notches having regular pitches is formed in the leading edges or trailing edges of the blades 19. See Abstract and Figure 10 of Sato.

However, the asserted combination of Sato and Patel fails to disclose a rate of  $M/S$  of length  $M$  of smooth portions to pitch  $S$  of notches as claimed. Specifically, the claimed invention defines a plurality of notches on an outer edge of a pair of side edges of each of the blades of the cross-flow fan. The claimed invention also defines the rate  $M/S$  being set to a specific range,  $0.3 < M/S < 0.8$ . With the claimed rate of  $M/S$  of length  $M$  of smooth portions to pitch  $S$  of notches set to this specific range, the vortexes flowing out from the notches are stabilized and the noise reduction in the cross-flow fan is improved. This is clearly illustrated in Fig. 7 of the present application.

In contrast, Sato is completely silent with respect to providing smooth portions between adjacent notches as claimed. While Patel discloses smooth portions between adjacent notches, Patel does not disclose the claimed rate of  $M/S$  of length  $M$  of smooth portions to pitch  $S$  of notches being set to the specific range. Instead, the widths of the smooth portions in Patel are very small. As such, vortexes flowed out from notches in Patel are overly segmentalized and unstabilized. As a result, there is interference of adjacent vortexes and noise reduction is not improved in Patel. Thus, the combination of Sato and Patel does not disclose a rate of  $M/S$  of length  $M$  of smooth portions to pitch  $S$  of notches being set to a specific range,  $0.3 < M/S < 0.8$ , as claimed.

Furthermore, Patel is not concerned with a cross-flow fan as claimed. Instead, Patel discloses that notches are formed in the trailing edge of a blade in the propeller fan. However, the claimed rate of  $M/S$  is specific to the edges of the blades in a cross-flow fan, but not to the

trailing edges of the blades in a propeller fan disclosed in the Patel. Thus, Patel is completely silent with respect to providing notches having the rate of M/S of length M of smooth portions to pitch S on the outer edge in a cross-flow fan as claimed. Moreover, while Sato discloses a cross-flow fan, it would not have been obvious to use the blades of a propeller fan in Patel in the cross-flow fan in Sato.

In addition, each of claims 2 and 5 specifies notches having the rate of M/S of length M of smooth portions to pitch S on the outer edge (leading edge) in a cross-flow fan. Thus, even assuming Patel can be combined with Sato, which Applicants do not admit, the asserted combination of Patel and Sato still does not disclose notches having the rate of M/S of length M of smooth portions to pitch S on the outer edge (leading edge) in a cross-flow fan as claimed.

In view of the above remarks with respect to independent claims 2 and 5, it is respectfully submitted that the asserted combination of Sato and Patel fails to establish *prima facie* obviousness. Takada has not been, and indeed cannot be, relied upon to make up at least the deficiency of Sato and Patel. The dependent claims are also patentable for at least their dependency. Thus, it is further respectfully requested that these rejections be withdrawn.

### **Conclusion**

All of the stated grounds of rejection have been properly traversed, accommodated, or rendered moot. Applicants therefore respectfully request that the Examiner reconsider all presently outstanding rejections and that they be withdrawn. It is believed that a full and complete response has been made to the outstanding Office Action, and as such, the present application is in condition for allowance.

In view of the above amendment, Applicant believes the pending application is in condition for allowance.

Should there be any outstanding matters that need to be resolved in the present application, the Examiner is respectfully requested to contact Dennis Powei Chen, Registration No. 61,767 at the telephone number of the undersigned below to conduct an interview in an effort to expedite prosecution in connection with the present application.

If necessary, the Director is hereby authorized in this, concurrent, and future replies to charge any fees required during the pendency of the above-identified application or credit any overpayment to Deposit Account No. 02-2448.

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Respectfully submitted,  


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